

Remarks

Preliminary Matters

Claim 2 has been cancelled because its text was superseded by the amendment to Claim 1. No Claims have been added. No additional fees are required. If determined otherwise, the Office is authorized to charge Deposit Account No. 07-1077 for the amount.

§ 103 Rejections

The following § 103(a) rejections were made.

1. Claims 1-3 and 5-9 using Jeong et al (US2002/0151653); and
2. Claims 1-3 and 5-9 using Abdou-Sabet (US6100334)

In response, Applicants have amended their claims and submit these remarks in support of those amendments.

Support for the amendments appears throughout the specification and claims as filed. New text in Claim 1 came from Claims 2, 3 and 9. Claims 1 and 9 have been made consistent in the use of the phrase "EPDM rubber."

All pending Claims 1, 3, and 5-9 as amended are patentably inventive over the two different references identified above because all pending claims now:

- (a) restrict the ingredients to only those which are essential, namely: polypropylene, EPDM rubber, the compatibilizer chosen from the Markush Group listed in Claim 1, and the oil; and
- (b) restrict the minor amount of compatibilizer to be present only from about 2 to about 4 weight percent of the compound.

Neither of the two references limits their compositions to only a continuous phase of one type of polyolefin, a dispersed phase of one type of rubber, a compatibilizer, and oil. Neither of the two references discloses the use of such a small amount of any of the Markush-listed copolymers to serve as a *compatibilizer*.

Jeong et al.

Jeong et al. do not disclose any material, *per se*, to serve as a *compatibilizer*.

Therefore, Jeong et al. at a first level teach in a different direction than the course chosen by Applicants: to have a minor amount of select types of polymers to serve as a compatibilizer to a continuous phase of polypropylene and a dispersed phase of EPDM rubber.

The Office has asserted that, in Table 2 of Jeong et al., the ethylene alpha olefin copolymers ("EPM" and "EOR") encompass Applicants' component (c)¹. But a review and calculation of Table 2 shows the weight percent of EPM or EOR in the Examples 1-4 and Comparative Examples 1-3 is as follows:

Ex. 1	Ex. 2	Ex. 3	Ex. 4	Comp. 1	Comp. 2	Comp. 3
EPM	EPM	EPM	EPM	None	None	EOR
13.69%	9.38%	13.95%	14.08%	None	None	14.49%

Applicants claim their compatibilizer is only present in the compound from about 2 to about 4 percent of the compound, less than half taught by Jeong et al. to be practical (and even then assuming that a Comparative Example teaches anything positive about the use of EOR.) Applicants' claimed range now correlates with their Examples of unexpected results seen in Applicants' Tables 2-5. Applicants' claimed range is also below even the 5 weight percent level identified in Paragraph [0020], which itself is not instructive or suggestive for compatibilizer content alone because the paragraph concerns the amount for *all* olefin-base copolymer rubber present in the compound taught by Jeong et al, *even the dispersed rubber phase*. One skilled in the art must resort to review of the Examples for a teaching of how much EPM or EOR to use.

Applicants claim a compatibilizer content well below anything practically demonstrated by Jeong et al. **That is one patentable distinction from Jeong et al.**

¹ The only example of EOR is a *comparative example* showing that Jeong et al. do not recognize the value of EOR as a compatibilizer, as do Applicants.

Applicants claim their thermoplastic vulcanizate blend to consist essentially of polypropylene, EPDM rubber, compatibilizer (at only about 2-4 wt.%), and oil. In Table 2, Jeong et al. require additional polymeric ingredients which Applicants do not want, namely: polypropylene PP-3 which was not used to make any of the TPE-1, TPE-2, or TPE-3 formulations and having a different melt index from PP-1 and PP-2 which were used; low density polyethylene (LDPE); and high density polyethylene (HDPE).

At the very least, Jeong et al. require the use of polyethylene resin; Applicants do not want polyethylene resin in their continuous phase. **That is a second patentable distinction from Jeong et al.**

Abdou-Sabet

Abdou-Sabet requires a norbornene/a-olefin/diene rubbery polymer (abbreviated "C₂-NB-ENB" or "C₂C₃-NB-ENB" in the Example Tables), whereas Applicants require EPDM rubber to be their only rubber in the blend of Claim 1.

In the Examples, either EPDM, Styrene-butadiene block copolymer (SBC), or EPR is used as a compatibilizer (according to Col. 6, Lines 40-67 and Col. 7, Lines 1-48). But the compatibilizer is used for a blend of PP and either C₂-NB-ENB rubber or C₂C₃-NB-ENB rubber, not a blend of PP and EPDM rubber which Applicants claim.

Also EPDM, SBC, and EPR are considered interchangeable by Abdou-Sabet as possible compatibilizers. But Applicants require EPDM rubber to be their discontinuous phase rubber, not to serve as a compatibilizer. Applicants want and claim a specific list of polymers to serve as their compatibilizer for their PP/EPDM rubber continuous phase/dispersed phase thermoplastic vulcanizate for the reasons of rubber particle size reduction and lower melt flow rate identified in Claims 8 and 9 and exemplified in the Examples.

Applicants do not want or claim the use of C₂-NB-ENB rubber or C₂C₃-NB-ENB rubber as their dispersed phase; Applicants claim EPDM rubber as their dispersed phase. **That is one patentable distinction from Abdou-Sabet.**

Even when considering the use of EPR, SBC or EPDM as a compatibilizer (and Applicants do *not* want to use EPDM as a compatibilizer) Abdou-Sabet does not indicate how much compatibilizer to use in the text at Col. 6, Lines 40-67 and Col. 7, Lines 1-48. For that, one skilled in the art must resort to the calculations from the teaching of the Examples. The weight percent of the EPR, SBC, or EPDM compatibilizer in Abdou-Sabet's compounds is as follows:

Ex. D29	Ex. D30	Ex. F39	Ex. F40	Ex. G45	Ex. G46	Ex. G49
EPDM	EPR	EPDM	EPR	EPDM	EPDM	SBC
9.30%	9.30%	8.84%	8.84%	9.22%	8.83%	9.22%

Ex. G52	Ex. G53	Ex. 3	Ex. 5	Ex. 6	Table VI No. 1	Table VI No. 2	Table VI No. 3
EPR	EPR	EPDM	EPDM	EPR	EPR	EPR	EPDM
9.22%	8.83%	8.45%	8.83%	8.83%	13.33%	12.53%	12.53%

With respect to Ex. G49, using SBC, a compatibilizer in Applicants' claimed Markush list, Abdou-Sabet reported in Table IV *no improvement* to compatibility.

Applicants found particle size was reduced with the use of 4% or 2% of a SBC serving as a compatibilizer. Please see, in Applicants' specification, Comparative Examples F and G in comparison with use of 4% SBC in Examples 5 and 10, respectively; Comparative Examples I and J in comparison with use of 2% SBC in Examples 14 and 18, respectively; and Comparative Example K in comparison with use of 2% SBC in Example 21.

With respect to Ex. G52, compared with Ex. G53 of Abdou-Sabet, only the addition of zinc oxide, $\text{SnCl}_2\text{-H}_2\text{O}$, and phenolic resin resulted in acceptable compatibility, *even when using EPR as a compatibilizer for a blend of PP and $C_2\text{-NB-ENB}$ rubber*. This comparison of Ex. G52 and Ex. G53 shows it is *not* straightforward to one skilled in the art that a compatibilizer alone is sufficient to provide compatibility.

With respect to Table VI, Nos. 1-3, there appears to be an error in the data in that no polypropylene content is reported.

One skilled the art would take from the analysis of compatibilizer content in the Tables of Abdou-Sabet that

- (a) a minimum of 8.45 weight percent is required;
- (b) EPDM, SBC, and EPR are considered interchangeable candidates as compatibilizers for a blend of PP and either C₂-NB-ENB rubber or C₂C₃-NB-ENB rubber;
- (c) EPR alone without other ingredients results in unacceptable compatibility results (comparing Ex. G52 with Ex. G53); and
- (d) SBC offered no improvement to compatibility (Ex. G49).

None of that teaching or suggestion to one skilled in the art would lead that person to use EPR, SBC, or other compatibilizers listed in Applicants' Claim 1 for a blend of PP and EPDM rubber, *especially* in an amount less than half of Abdou-Sabet requires. **That is a second patentable distinction from Abdou-Sabet.**

The Office states there is a need for a showing of surprising or unexpected results. Applicants refer the Office to their Examples to demonstrate such surprising and unexpected results. In Tables 2-5, Applicants have provided 6 different Comparative Examples and 21 Examples to offer proof of surprising and unexpected results. Each of Tables 2-5 has a particle size analysis for each Comparative Example and Example so listed. Table 5 also has a melt flow determination of surprising results.

Applicants request a Notice of Allowance for Claims 1, 3, and 5-9.

10/530,361
Jarus et al.
GAU: 1796 (J. Mullis)

If there are any matters that prevent a Notice of Allowance, the Examiner is invited to contact the Undersigned by telephone.

Respectfully submitted by:

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Date

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